

Dear Sir

Fort Gratiot Mich

24th Aug. 1849

I am indebted to the courtesy of some friend at Cambridge, perhaps Prof. Longfellow or yourself, for a copy of the Evening Traveller of the 16th inst. containing the proceedings of the Scientific Convention on the first day.

I am pleased to learn that you have in your Botanical Garden a specimen of the Silphium laciniatum. My object in writing is to request that you will take the trouble to make the experiment alluded to by Dr. Hare of seeing if its leaves can be moved under the influence of "a powerful steel magnet or an electro-magnet". I always wished to do so, but never had the opportunity on the frontier where I saw the plant - Delicate instruments to test the presence of magnetism in minute quantities could also be applied -- The latter experiment might be most satisfactory: ~~as a powerful magnet might well find in many plants something to be attracted -~~

My main object was to give facts not a theory - I shall be glad to see any exact solution of the phenomenon; & to yield more conjectures at once —

You state in your remarks before the Convention that the fact of its tendency to point north & south is probably to be accounted for by the action of light, "leaves being disposed

as is well known to turn their upper surface to the light" - Answer - If this tendency existed in the Sulphium Acinatum, should not the leaf present its face to the sun at mid-day when the light of the sun is most intense? - On the contrary it turns its face towards the rising or setting sun when its rays are most oblique and least intense. At noon its plane passes through the sun, as it were shunning instead of seeking, its fiercest rays. (This I suggested in my first comm^{to Natl. Institut.} in 1842.)

— However, the fact of the radical leaves in the Botanic Garden not exhibiting the peculiarity would favor, ^{your} ~~the~~ idea, as it is probable that in that garden it is not subjected as regularly and completely to the action of the sun's light as on the prairie. Your suggestion "that vertical leaves tend to take a position which exposes the two surfaces equally to the light of the sun," may be the true explanation of all the phenomena. This tendency (I suggest) would be different from a disposition to present the surface of the leaf to the strongest light, as alluded to above.

I used the phrase "polarity" only with reference to the tendency of the leaf to arrange itself north & south, without reference to the cause for the same. The name "Polar Plant" was the one I first heard given to it by the officers of Dragoons in 1839 west of Arkansas, whom I first saw it, & it is the name used by Major Nathan Boone with whom I conversed about it. The words Polar & Polarity are I think

often used in a sense not alluding to the presence of magnetism, as in your Manual - p. 12, par. 16th.

If the plant was caused to grow on the top of a house perhaps it would exhibit the same peculiarity as on the prairie, & that would confirm your theory, or suggestions -

I will beg your permission to add a few lines on the subject of my suggestion as to electrical currents. I did not (as your remarks would convey the idea) suggest that the resinous matter of the plant would conduct such currents - The fluids of the plant might conduct them - It is found in Electro-magnetism that there are many arrangements of electric currents in one plane (turning on a vertical axis) which would cause that plane to point north & south - Also all students of Electro-magnetism know that electrical currents sent through a spiral coil (what Amperé calls an "Electro-dynamic coil") will cause that coil when revolving on a vertical axis to arrange itself north & south - Now botanical works inform us that plants are made up of minute cells permeable to fluids, that they often contain (see your Manual par. 9) spiral vessels, or elongated cells, or ducts, made up of a coat of delicate fibres - In another part you speak of the medullary sheath consisting of an "extremely delicate ring of spiral vessels, the earliest formed part of the woody system" - In par. 58 you speak of the woody tissue as also entering into the composition of leaves. - Again the experiments of Faraday & others have led to the supposition that the number of substances in nature in which electric or galvanic currents can be excited are very numerous, see p. 99 of Dr. Roget's treatise on Electro-magnetism - I must therefore be allowed to say that

the idea is not to be at once rejected that electric currents might permeate the plant, conveyed by its juices -- The modus-operandi is another thing -- (The action of the Torpedos in giving electric shocks is not yet fully explained see Sir Humphry Davy or Rogets Galvanism (p. 89) Resinous matter is a substance in which electricity is easily excited by friction, but it would remain still to show how galvanic currents were established -- I referred to the existence of resin in the plant, without stating how its presence would act, but as a notable fact --

The testimony of Prof. Morris would appear to be conclusive as to the peculiarity of the plant as he states that when as a surveyor he was running with compass in land, East & West lines, he would uniformly see their broad faces -- This confirmation, with that of Mr. Lapham in his communication to you, together with what I have adduced, would seem to leave no room to doubt of the reality of the phenomenon --

I hasten to write you as if you shall concur with my request to make the experiments above alluded to, it should be done as soon as possible, before the plant loses any of its vigor by the approach of autumn -- It will confer a favor if you will write me the result of such experiments --

With high respect
I remain very truly
Your obedient

Prof. Asa Gray M.D.
Harvard Univ, Cambridge
Mass

Benj. Alvord